WHAT IS CLAIMED IS:

1. A semiconductor light-receiving device comprising:

a semi-insulating substrate;

a semiconductor layer of a first conduction type that is formed on the semi-insulating substrate;

a buffer layer of the first conduction type that is formed on the semi-insulating substrate and has a lower impurity concentration than the semiconductor layer of the first conduction type;

a light absorption layer that is formed on the buffer layer and generates carriers in accordance with incident light;

a semiconductor layer of a second conduction type that is formed on the light absorption layer; and

a semiconductor intermediate layer that is interposed between the buffer layer and the light absorption layer, and has a forbidden bandwidth within a range lying between the forbidden bandwidth of the buffer layer and the forbidden bandwidth of the light absorption layer.

2. The semiconductor light-receiving device as claimed in claim 1, wherein the impurity concentration of the buffer layer is lower than $1 \times 10^{17}$ $cm^{-3}$.

3. The semiconductor light-receiving device as claimed in claim 1, wherein the semiconductor intermediate layer includes a plurality of semiconductor layers, with forbidden bandwidths being varied stepwise.

4. The semiconductor light-receiving device as claimed in claim 1, wherein the semiconductor intermediate layer includes a plurality of semiconductor layers, with forbidden bandwidths being

periodically varied.

5. The semiconductor light-receiving device as claimed in claim 1, further comprising a composition-graded semiconductor intermediate layer that is interposed between the light absorption layer and the semiconductor layer of the second conduction type, with forbidden bandwidths being varied stepwise.

6. The semiconductor light-receiving device as claimed in claim 1, wherein the semiconductor intermediate layer has a lower refractive index than the light absorption layer.

7. The semiconductor light-receiving device as claimed in claim 1, further comprising:

a first electrode unit that is electrically connected to the semiconductor layer of the first conduction type, with a first potential being applied to the first electrode unit; and

a second electrode unit that is electrically connected to the semiconductor layer of the second conduction type, a second potential being applied to the second electrode unit.

8. The semiconductor light-receiving device as claimed in claim 1, wherein:

the light absorption layer is an InGaAs layer; and

the buffer layer is a $In_{1-x}Ga_xAs_yP_{1-y}$ ($0 \leqq x \leqq 1$, $0 \leqq y \leqq 1$).

9. The semiconductor light-receiving device as claimed in claim 1, wherein at least the light absorption layer and the semiconductor layer of the second conduction type form a mesa structure, with light entering the light absorption layer through a

side surface of the light absorption layer that is exposed in a process of forming the mesa structure.

10. The semiconductor light-receiving device as claimed in claim 9, further comprising a semiconductor optical waveguide path that is formed on the semi-insulating substrate and guides light to the light absorption layer.

11. The semiconductor light-receiving device as claimed in claim 1, comprising a PIN-type photodiode.

12. The semiconductor light-receiving device as claimed in claim 1, comprising an avalanche photodiode.

13. The semiconductor light-receiving device as claimed in claim 1, wherein the semiconductor layer of the second conduction type has a light receiving surface formed thereon.

14. The semiconductor light-receiving device as claimed in claim 1, wherein the semi-insulating substrate has a light receiving surface on the bottom surface thereof.

15. The semiconductor light-receiving device as claimed in claim 1, wherein the first conduction type is N type.

16. A semiconductor light-receiving device comprising:

a semiconductor substrate of a first conductivity type;

a buffer layer of the first conductivity type that is formed on the semiconductor substrate and has a lower impurity concentration than the semiconductor substrate;

a light absorption layer that is formed on the buffer layer and generates carriers in accordance with incident light;

a semiconductor layer of a second conductivity type that is formed on the light absorption layer; and

a semiconductor intermediate layer that is interposed between the buffer layer and the light absorption layer, and has a forbidden bandwidth within a range lying between the forbidden bandwidth of the buffer layer and the forbidden bandwidth of the light absorption layer.

17. A semiconductor light-receiving device comprising:

a semi-insulating substrate;

a semiconductor layer of a first conduction type that is formed on the semi-insulating substrate;

a buffer layer of the first conduction type that is formed on the semiconductor layer;

a light absorption layer that is formed on the buffer layer and generates carriers in accordance with incident light;

a semiconductor layer of a second conduction type that is formed on the light absorption layer; and

a high-concentration semiconductor intermediate layer of the first conduction type that is interposed between the buffer layer and the light absorption layer and has a higher impurity concentration than the buffer layer.

18. The semiconductor light-receiving device as claimed in claim 17, wherein the impurity concentration of the buffer layer is lower than $1 \times 10^{17}$ $cm^{-3}$.

19. The semiconductor light-receiving device as claimed in claim 17, wherein the high-concentration semiconductor intermediate layer has an impurity

concentration of $2 \times 10^{18}$ $cm^{-3}$, and a film thickness of 100 nm or smaller.

20. The semiconductor light-receiving device as claimed in claim 17, further comprising a contact layer of the first conduction type that is interposed between the semi-insulating substrate and the buffer layer, the contact layer having a high impurity concentration, with a predetermined potential being supplied to the contact layer.

21. The semiconductor light-receiving device as claimed in claim 17, wherein at least the light absorption layer and the semiconductor layer of the second conduction type form a mesa structure, with light entering the light absorption layer through a side surface of the light absorption layer that is exposed in a process of forming the mesa structure.

22. The semiconductor light-receiving device as claimed in claim 21, further comprising a semiconductor optical waveguide path that is formed on the semi-insulating substrate and guides light to the light absorption layer.

23. A semiconductor light-receiving device comprising:

a semiconductor substrate of a first conduction type;

a buffer layer of the first conduction type that is formed on the semiconductor substrate and has a lower impurity concentration than the semiconductor substrate;

a light absorption layer that is formed on the buffer layer and generates carriers in accordance with incident light;

a semiconductor layer of a second conduction type

that is formed on the light absorption layer; and

a high-concentration semiconductor intermediate layer of the first conduction type that is interposed between the buffer layer and the light absorption layer and has a higher impurity concentration than the buffer layer.